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ABSTRACT

This paper presents the framework used in implementing "Marketing on the Web," an interdisciplinary course that integrates marketing and technology strategies, with an approach that is grounded in cognitive psychology and in constructionist theory. Though applied at the undergraduate level, the framework may be adapted to primary through graduate levels. The course is co-taught by two faculty: one from computer information systems (CIS) and one from marketing. Experimenting, creating, revising, discussing, publishing, and reflecting on works of their own, students are able to understand theory through action and experience the business value of technology through its application. Following discussion of the conceptual foundation, the instructional strategy is outlined, based on the five instructional principles suggested by Marzano and Reid et al. These include: Motivation: The Engagement Phase; Acquiring and Integrating Knowledge: The Exploration Phase; Extending and Refining Knowledge: The Transformation Phase; Using Knowledge Meaningfully: The Presentation Phase; and Productive Habits of Mind: The Reflection Phase. Contains 32 references. (AEF)

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Research Paper: Connecting Technology to Teaching and Learning

eEducation: Interdisciplinary Crossroads

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> The world of e-business is percolating so far up into every field, said General Motors Vice President and CIO Ralph Szygenda, that he expects every graduate that walks into his office looking for a job to have e-commerce knowledge—both about the nuts and bolts of the technology and the business understanding to go along with it. (Vaas, 1999, p. 69)

Introduction

It is 1974. Ohio State University has just published *Making Toys through Teamwork*. As fifth- and sixth-grade students manage their toy companies, they not only learn the techniques of wood construction and mass production but also inductively develop an understanding of marketing principles.

It is 1980. Seymour Papert polishes his final draft of *Mindstorms*, advocating a constructionist approach to education, in which learners construct knowledge by solving reality-based problems, exploring the limits of their own understanding.

It is 1990. Tim Berners-Lee prepares to introduce the world to the World Wide Web, an event that inadvertently begins to rewrite the rules of how marketers interact with their customers.

It is February 1999, and the confluence of these three events is about to change the way students at a small New England college think about marketing, technology, and their role in enterprise.

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This paper presents the framework we used in implementing Marketing on the Web, an interdisciplinary course that integrates marketing and technology strategies. We have grounded our approach in cognitive psychology (Piaget, 1967, 1970; Rumelhart & Norman, 1978) and in constructionist theory (Papert, 1980, 1993, 1996). While we have applied the framework at the undergraduate college level, it may profitably be adapted to other levels, primary through graduate.

The course is co-taught by two faculty: one from computer information systems (CIS) and one from marketing. It is designed to provide a unique opportunity for students to build on and integrate the concepts and skills acquired in prior semesters. It affords students an opportunity not only to expand and extend their Web development skills but also to understand that they must be applied in a directed manner if they are to be of value in solving business problems. Marketing concepts come alive as students, no longer constrained to studying theory and analyzing the work of others, become active participants. Experimenting, creating, revising, discussing, publishing, and reflecting on works of their own, they understand theory through action and experience the business value of technology through its application. In an environment made possible only through an interdisciplinary approach students are getting an eEducation.

Conceptual Foundation

In 1980 Seymour Papert championed the superiority of "learning by doing" in *Mindstorms: Children, Computers and Powerful Ideas*, which laid out a conceptual framework for how computers could be used in education. He termed his approach *constructionism*[1]. These ideas were later expanded in *The Children's Machine* (1993) and *The Connected Family* (1996). Papert's thesis is that "old" ways of learning were artifices of the available technology—books, teachers to lecture, paper, and pencils. Computers, he suggests, allow people to learn in a more innate fashion. He argues that this internally driven learning, in which people learn "what they need to know in order to carry things out," is a superior educational process. Following this model, the role of the teacher is to create the conditions for discovery rather than to provide ready-made knowledge (Papert, 1996, p. 45).

Papert articulated the concept in a 1983 speech in which he draws a distinction between teaching and learning.

> Teaching denotes a kind of fluidic theory of learning in which litres of knowledge fluid are transferred from the teacher vessel to a student vessel. We have this notion of the student being filled up from the wise container known as the teacher. I always like the [term] learning because learning denotes the process that is happening in the learner. I think what we really want to happen in education is to get that process energized and going because then the learners can function as they must for most of their life without depending on an explicit teacher. (Harper, 1989, p. 62)

Active learning is the hallmark of Papert's constructivist theory. His basic insight on the potential of active learning is the principle behind the phenomenon observed by Ohio State a quarter of a century ago as well as the one we employ in Marketing on the Web. As students do marketing they learn marketing. Active learning has been a recognized educational goal within the educational community for some time. Teachers have tried various approaches to experiential learning in the university classroom including the use of creative questioning techniques (Hallgren, 1982), data collection and analysis projects (McCorkle, Denny, Diriker, & Alexander, 1992), participatory examinations (Graham, Graham, & Whiting, 1997), as well as case analyses and research projects. While these are effective improvements to a straight lecture/discussion format, none provides the constructivist learning environment advocated by Papert.

Instructional Strategy

Papert's model was based largely on the work of Jean Piaget (Harper, 1989), who coined the phrase, "to understand is to invent" (Papert, 1996). Piaget advocated an environment that stimulates the learner to build his/her own intellectual structures through planning, estimation, interaction, experience, revision, and extension (Watts, 1989).

Papert's and Piaget's ideas have been extended by other researchers interested in learning and curriculum design. Two are of particular interest for this paper. Marzano (1992) employed constructivism as a basis for developing curriculum planning principles, which he termed "dimensions of learning." Reid, Forrestal, and Cook (1989) were interested in articulating the phases of successful collaborative learning projects. Table 1 presents these approaches side by side. We found that patterning our course around the five instructional principles suggested by Marzano and Reid et al. does indeed create an effective active learning environment. Further, the interdisciplinary nature of the course significantly promotes the constructivist goal of allowing students to create their own knowledge structures. The following five sections provide the explanations.

Table 1. Constructivist Theory and Two Applications

Piaget/Papert	Marzano (1992) Dimensions of Learning	Reid et al. (1989) Collaborative Learning Phases
	Attitudes and Perceptions About Learning (Motivation)	Engagement
Planning and Estimation	Acquiring and Integrating Knowledge	Exploration
Interaction	Extending and Refining Knowledge	Transformation
Experience	Using Knowledge Meaningfully	Presentation
Revision and Extension	Productive Habits of Mind	Reflection

Motivation: The Engagement Phase

> When the consumer looks at a Web page or a banner, the information that is presented there is processed by the human mind in several separate stages. Each of these stages is like a gateway. If the information does not make it past a stage, it is lost and the consumer has not been impacted by it.... The stages are (1) exposure, (2) attention, (3) comprehension ... (Hofacker, 2000, p. 47)

As any teacher can attest, the perception process (previously outlined by Hofacker) employed by marketers and communication experts applies equally well to the learning process. Exposing students to a problem is not enough; you also have to get their attention. For students to engage in active learning they must be inspired to solve a problem—ideally they should be absorbed by it. Students may view problems as engaging because they are novel, difficult, paradoxical, relevant, and the like. The opportunity to display their results on a Web page may in itself provide the required motivation (Abita, 1999; Batty-Hotz, 1999). But not everyone finds the same problems compelling. How does one choose problems that will appeal to each member of an entire class?

The importance of presenting authentic, relevant problems has been emphasized by teachers across specific subject areas including computer applications (Lowther, 1999), writing (Romano & Romano, 1999), science,

and business (Joyner & Pedersen, 1998), as well as in the general curriculum (Norton, 1999; Williams & Merideth, 1997). Following the Piagetian model, we would add that allocating some portion of the problem domain to the students themselves greatly enhances the probability of each student finding a problem compelling. We recently gave students in Marketing on the Web the task of developing a Web site for a small candy producer. One group centered on the sexy, romantic image associated with the exchange of candy, while another focused on the stereotypical busy executive whose main concern is minimizing the time required to schedule the reliable delivery of candy for special occasions. Both groups presented their problem statement with zeal. Each had taken ownership of a problem it wanted to solve.

It is worth noting that students, for the most part, do not seek out easy problems. As Papert points out, "Most dislike of school work comes from finding it boring, the exact opposite of finding it too difficult. *Children, like everyone else, don't want 'easy'—they want 'challenging' and 'interesting'—and this implies 'hard'*" (Papert, 1996, p. 52; emphasis in the original).

A side effect of giving students the freedom to explore the problem space is that they regularly bring fresh perspectives to the subject. We often found ourselves thinking, "Wow, how'd she think of that ... I couldn't do that!" Why couldn't we? Probably because we are too familiar with the subject. If you want to know about pebbles ask a two-year-old. To us they're gravel—to a two-year-old they're fascinating.

Acquiring and Integrating Knowledge: The Exploration Phase

Having explored the *problem* domain students begin to explore the *solution* space. To select a solution strategy they need information. Students also need to consider how a decision made in one area will affect other areas. If they design the site to enable direct sales, for example, what technological requirements does that decision entail? What effect will it have on their dealer network? Is the company equipped to handle direct orders, returns, and billing? Knowledge becomes active. Students seek out the information they need to solve the problem they defined.

In this exploration phase the value of an interdisciplinary course is most conspicuous. To be successful, students have to think beyond their current perspectives to incorporate new ones. Students are asked to refocus, to view a business problem from a new, broader enterprise perspective. CIS majors add marketing insights to their technological expertise; marketing majors learn to incorporate technology strategies in to their planning procedures. This process is difficult. Students have to make the conscious effort to create cognitive space for the new material. If accomplished successfully, the end result is a more sophisticated perspective. As Anderson suggests, "Schema change is the 'sine qua non' of the acquisition of knowledge as opposed to the mere aggregation of information" (1977, p. 430). Put more prosaically, the student now begins to see the elephant, not just the trunk (or the foot, or the tail ...).

Extending and Refining Knowledge: The Transformation Phase

As students begin to design their Web sites, controlled environments with which customers interact, they must transform their knowledge and theories into reality. Following the Piagetian model, the best place for this transformation to take place is an intellectual playground, a responsive learning environment they can explore and extend. The microworld of a Web site provides this environment. It furnishes a set of primitives (text, graphics, sounds, data, bandwidth) and a set of constructs for organizing and acting on those primitives (hypertext markup language [HTML], pages, tables, frames, hypertext links, animations, forms). To this we add a set of marketing constructs. Students use these elements to create (invent) environments uniquely their own. Their creations reflect the goals they have established for their sites and their own

individual styles in reaching those goals. Their success depends largely on the interplay between CIS and marketing concepts. Students constantly have to ask themselves questions such as "What other techniques and technologies might we use in constructing this Web site?" and "How will the target market react to a site that requires them first to download and install a Shockwave Plug-In?"

Throughout the course each Web site is always a work in progress. As students are exposed to new concepts and techniques they revise and extend their world to incorporate the new elements now at their disposal, thereby completing the constructivist loop. Feedback is ultimately provided at several levels. In this phase it is provided by the Web directly to the individual or group developing the site—does the site look and behave the way the student wants it to?

Using Knowledge Meaningfully: The Presentation Phase

Students are now ready to test their knowledge with a wider audience. As every teacher knows, we never learn a subject quite so well as when we have to explain it to someone else (Papert, 1993, p. 162). This same principle applies in a constructivist classroom. Students not only need to expand, modify, and build their knowledge structures, but they also have to be able to *communicate* that knowledge.

We facilitate this process by developing a critical ethic in the class, providing a second level of feedback. Beginning with the first week of classes, students critique each other's work orally. To discuss and comment on the effectiveness of their work, students must reflect on the criteria and standards of good marketing and good Web design. What is the apparent target market for the site? Does the intended message agree with the apparent one? Do animated GIFs enhance or detract from the site's purpose?

A third level of feedback comes from the instructors. We function as coaches, suggesting other areas the team may want to consider and helping students with difficult concepts. As much as possible, however, we try to avoid what Papert (1993) refers to as the intolerant insistence on "right" answers. Instead of pushing students to get it "exactly right" the first time, we adopted Papert's approach of helping students get it "vaguely right," so that there is room for them to redirect their efforts. The microworld of a Web site greatly facilitates this process. Students can easily try out different approaches, make changes and alterations—even completely change directions—in response to their own ideas and the critiques of classmates.

Productive Habits of Mind: The Reflection Phase

The constructivist philosophy is attractive because it engenders learning independence in students. As they take responsibility for their own education, they are also developing what Marzano refers to as productive habits of mind, mental processes that should stay with them throughout their lives, processes such as critical-thinking skills, an appreciation for learning strategies, and team skills.

The interdisciplinary nature of Marketing on the Web naturally leads to an environment that promotes the development of these processes. Reid et al. (1989) suggest that successful collaborative learning assignments must be complex enough so that a group with multiple perspectives and multiple knowledge sets is perceived to be better equipped to solve the problem than a group without these resources. A complex interdisciplinary problem would be of little value, however, if we were to allow the formation of homogeneous teams. Scholars have long known that heterogeneous groups render higher-quality decisions than homogeneous groups do (Fisher, 1980; Jensen & Chilberg, 1991). A diverse group brings different perspectives to bear on an issue. If group members are motivated to express their ideas and to listen to others, the result is a fuller consideration of a problem's complexities and alternative resolutions. We engender cross-fertilization by purposely

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balancing team membership so that neither CIS nor marketing majors dominate. Additionally, requiring that non-CIS majors explain the technology strategy and that CIS majors explain the marketing strategy during class presentations and critiques further engenders the exploration of alternative schema.

The complex interdisciplinary problem environment also fosters an appreciation for learning about learning. Success depends largely on the ability of each group member to assimilate the concepts and techniques of the "foreign" discipline. Much as a child with the latest video game wants to be the first on the block to master it, groups that find efficient means of cross-fertilization are the first to bear fruit. It is not that they are having so much fun that they don't know they are learning. Rather they see learning as a desirable goal and look for better ways to accomplish it.

We would also submit that an interdisciplinary course by its very nature adds an important collaborative layer: the interplay between the disciplines—in this instance marketing and CIS—which is personified by the collaboration between the instructors. We have found it helpful, for example, for the CIS professor to express the importance of supporting a Web site's development strategy with good marketing theory. CIS students seem to perceive his admonition not to overdo the whiz-bang of technology as more valid than when the same comment comes from the marketing professor.

The Obvious Question

At this point, the reader may be thinking, "If I divert class time to teach Web development (marketing), won't I have to cut out some of the marketing (Web development) content I cover?" There are two problems with this line of thinking. First, it assumes that marketing and computer information systems are separate and distinct disciplines. In the real world of enterprise development there is considerable overlap. The second problem, while less obvious, is just as important. It relates to the economic theory of roundabout production proposed by Böhm-Bawerk (1932) and Richard Ely (1902)—if your economics class had been constructivist-based you'd remember them!

Consider two tailors in the 1850s, about the time of Elias Howe, A. B. Wilson, and Isaac Singer. One decides to forego some current production and invest time and resources in one of those newfangled sewing machines (roundabout production); the other doesn't. The tailors quickly discover that he who invests in and applies the best tools wins. As the chair of the Utah Strategic Planning Commission observed in 1988, "Throughout history, every significant increase in human productivity has involved the better use of tools" (Thomas & Knezek, 1995).

Does this principle apply to education as well as economics? There is evidence that it does. Cutting (1990) provides an apt example. He was teaching Prolog programming to undergraduates who had no prior computer experience. To do useful work with Prolog, students had to understand the concept of *recursion*. Recursion is a difficult concept and a significant number of students were unable to master it in the allotted time. While Prolog relies on recursive techniques, it is not a particularly good tool for teaching them. Logo, on the other hand, is an excellent tool for teaching recursion. Cutting found that students who first learned Logo, followed by Prolog, were able to do more with Prolog than students who spent comparable total time on Prolog alone. By investing time to learn Logo he was able to cover more material, not less.

We suggest that the same principle applies to integrating Web development with marketing. Marketing provides a context-rich environment ideal for understanding how Web development theory and techniques can be applied in a business setting. Rather than simply developing a "cool" Web site, students develop an

appreciation for how technological expertise can add value to an organization's marketing strategy. Each discipline serves as an effective tool for understanding the other.

Conclusion

John Dewey (1916) once said that the goal of education is not just to acquire information, but to be able to apply it. His thoughts echo almost a century later in the comments of General Motors Vice President and CIO Ralph Szygenda in our introductory quotation. We suggest that if Dewey were alive today, he would very much favor an interdisciplinary eEducation.

An environment that motivates students to take an active role in the learning process, allows them to apply their newfound knowledge to real problems, and encourages them to push the limits of their understanding certainly is one that enhances education. Ohio State discovered this truth a quarter of a century ago with its Making Toys through Teamwork curriculum. Seymour Papert championed the idea almost 20 years ago. A decade ago Tim Berners-Lee developed a revolutionary new system for the exchange of information throughout the scientific community. In the process, he gave us not only a new medium for marketing but also a new environment, a technological playground for marketing theory, which makes it possible for us to realize Dewey's dream and meet Szygenda's expectations.

We are not alone in promoting the benefits of incorporating the Internet in to the classroom. What is different about our approach, however, is its interdisciplinary focus in which the technology is more than just a tool. Students learn the importance of developing a technology strategy consonant with an organization's marketing strategy.

Areas for Further Research

A course of this type has advantages beyond reinforcing, extending, and integrating concepts acquired in previous classes. Interdisciplinary courses would seem to be effective vehicles for *introducing* students to those topics as well. If true understanding comes from building complex intellectual structures with associative links among concepts, then students would benefit from being introduced to this process early in their educational careers. As with other learning environments based on constructionism, a course such as this one could be taught at a wide range of grade levels, from secondary school through college. Virginia's *Make It Your Business* curriculum for Grades 6–9 (*Guide to Marketing Course Competencies*, 1996) is one example. It appears to us that integrated courses could target Areas 3 (Conducting a Needs Assessment), 4 (Planning the Product or Service), and 5 (Preparing a Marketing Strategy) of that program. Would it fit in your curriculum as well? We would appreciate feedback …

Note

[1] Papert invented the term *constructionism* to distinguish his concept from that of Piaget. He says that "The name constructionism derives from an alternative model, according to which the learner has to *construct* knowledge afresh every time" (Papert, 1996, p. 45). He also notes that "my word will evoke the term *constructivism*, whose contemporary educational use is most commonly referred back to Piaget's doctrine that knowledge simply cannot be 'transmitted' or 'conveyed ready made' to another person" (Papert, 1993, p. 142).

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